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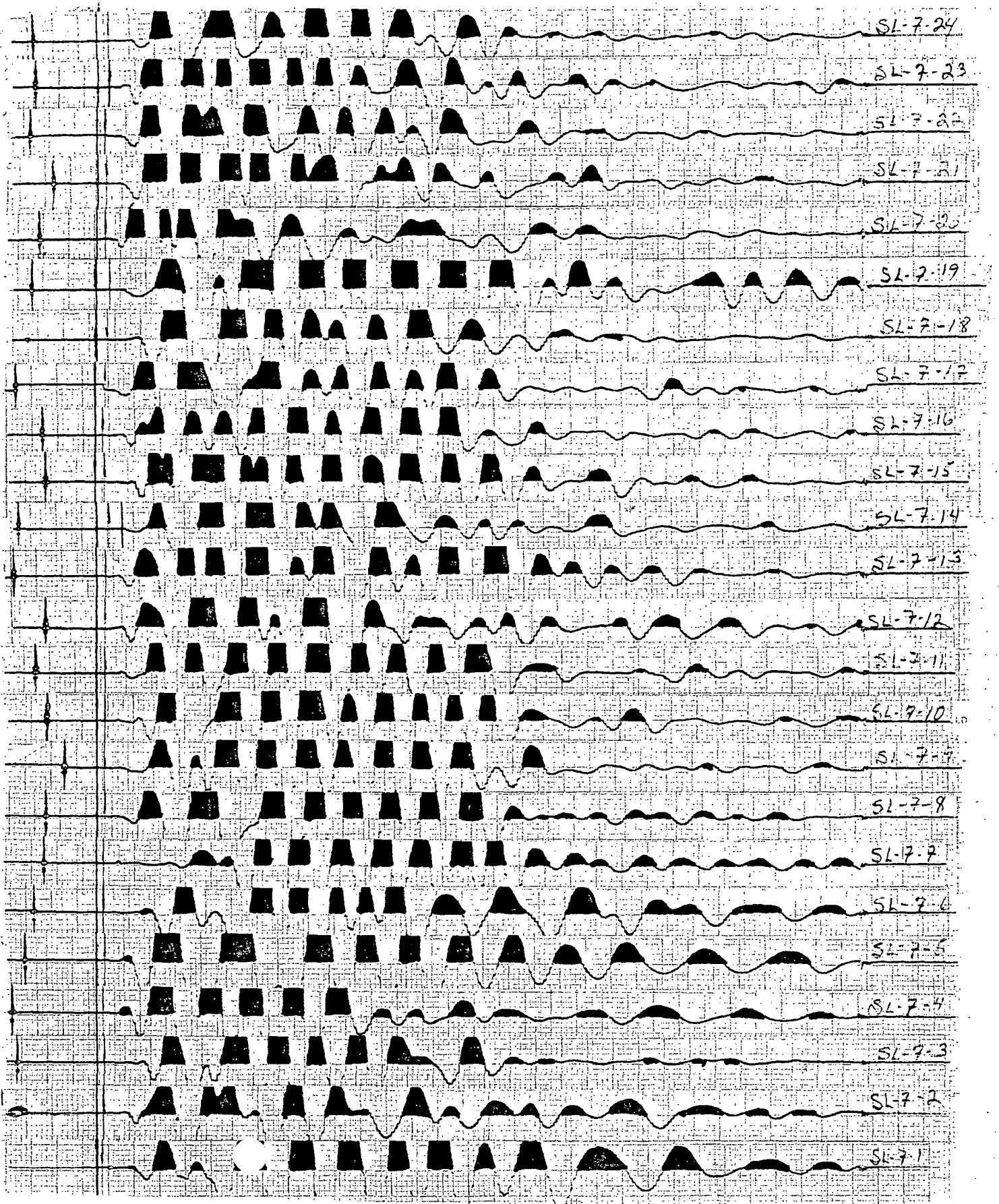

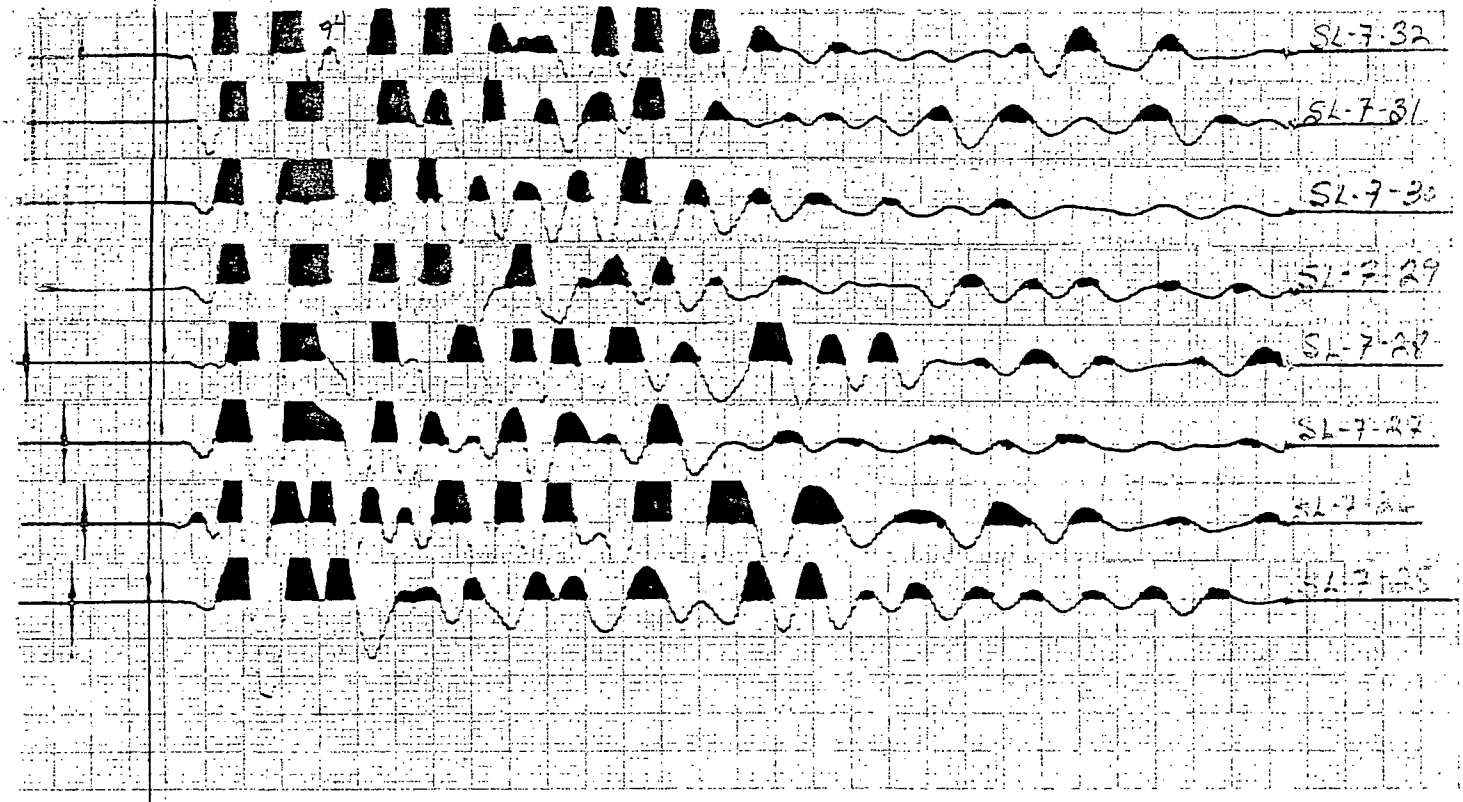
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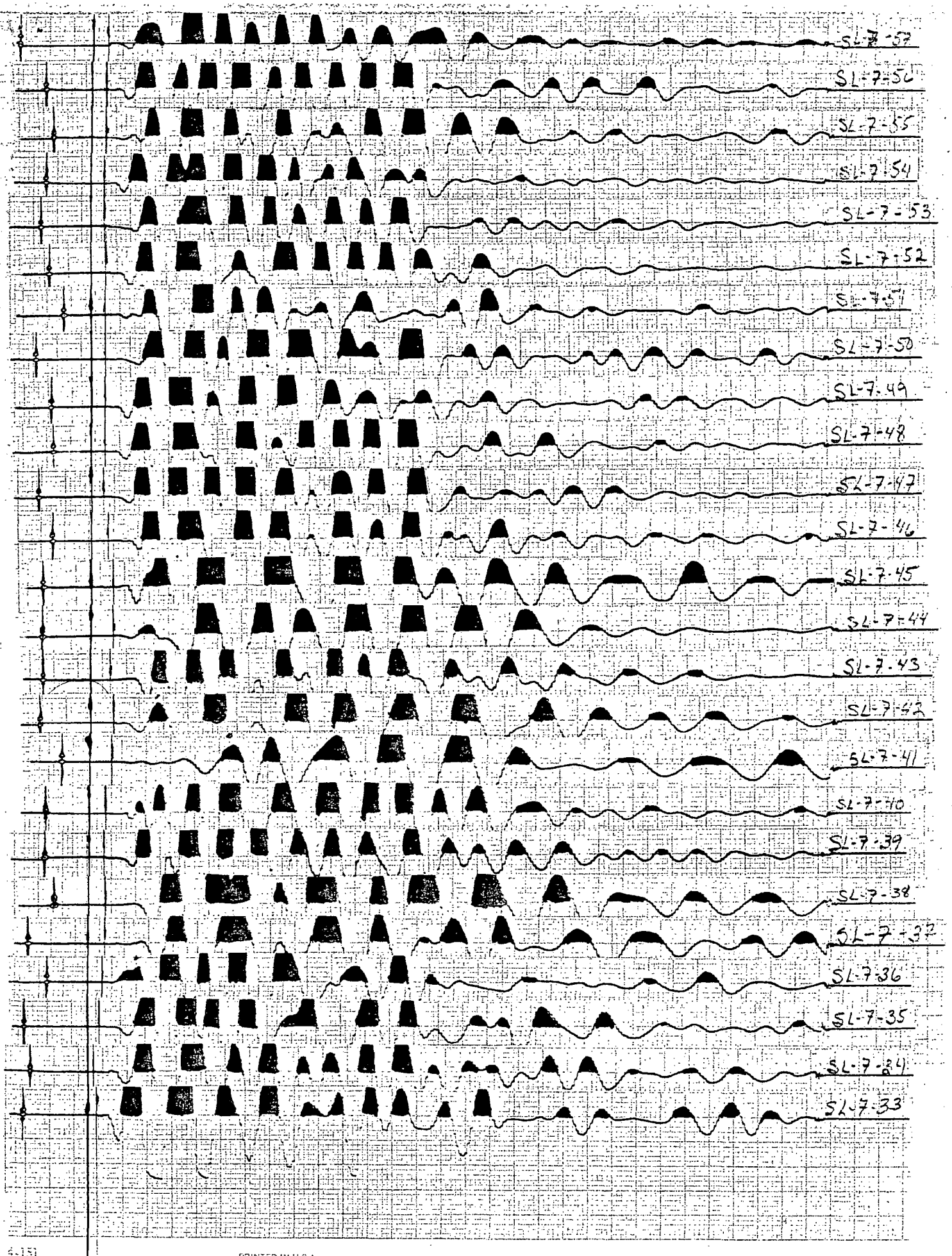

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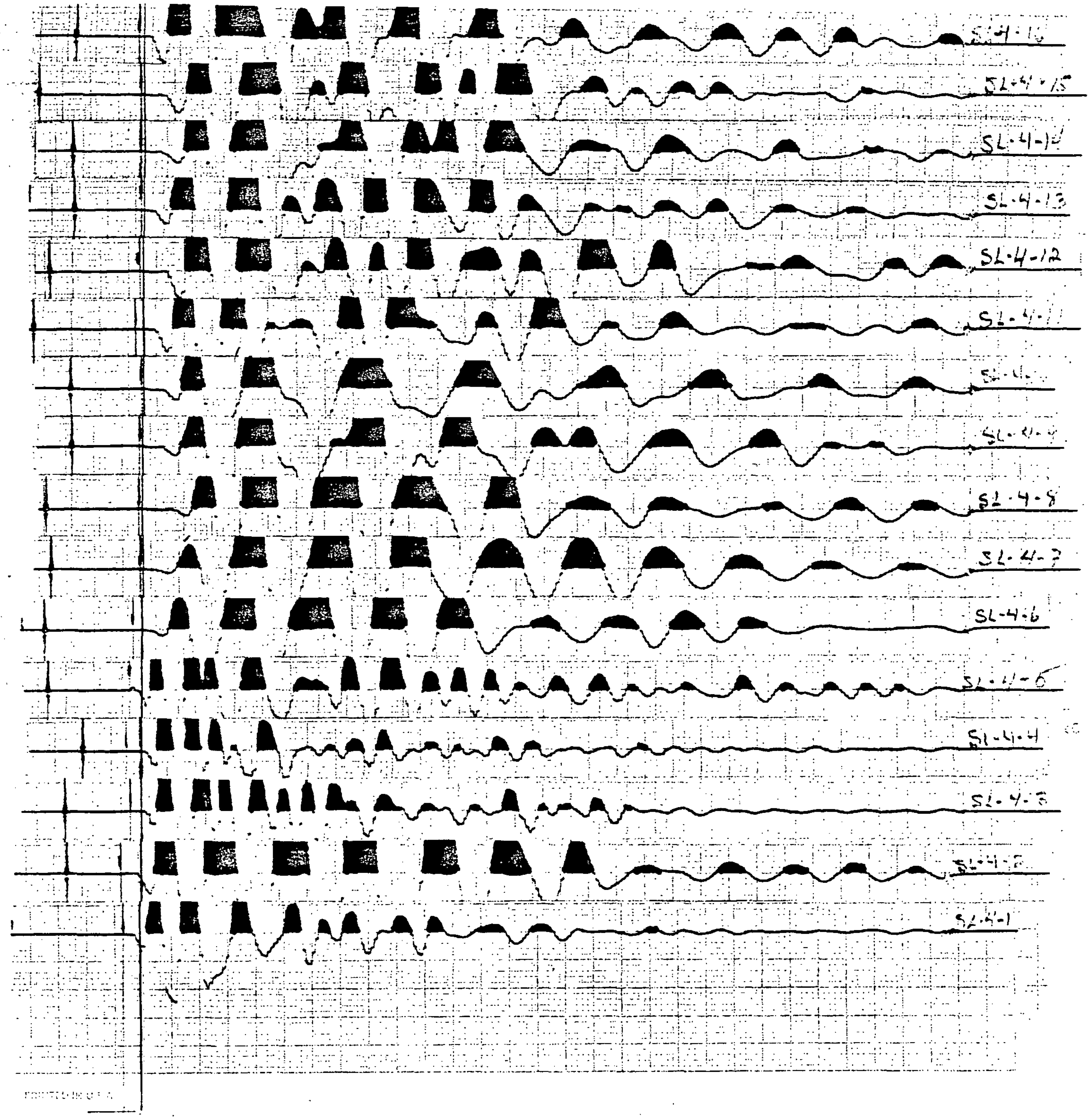

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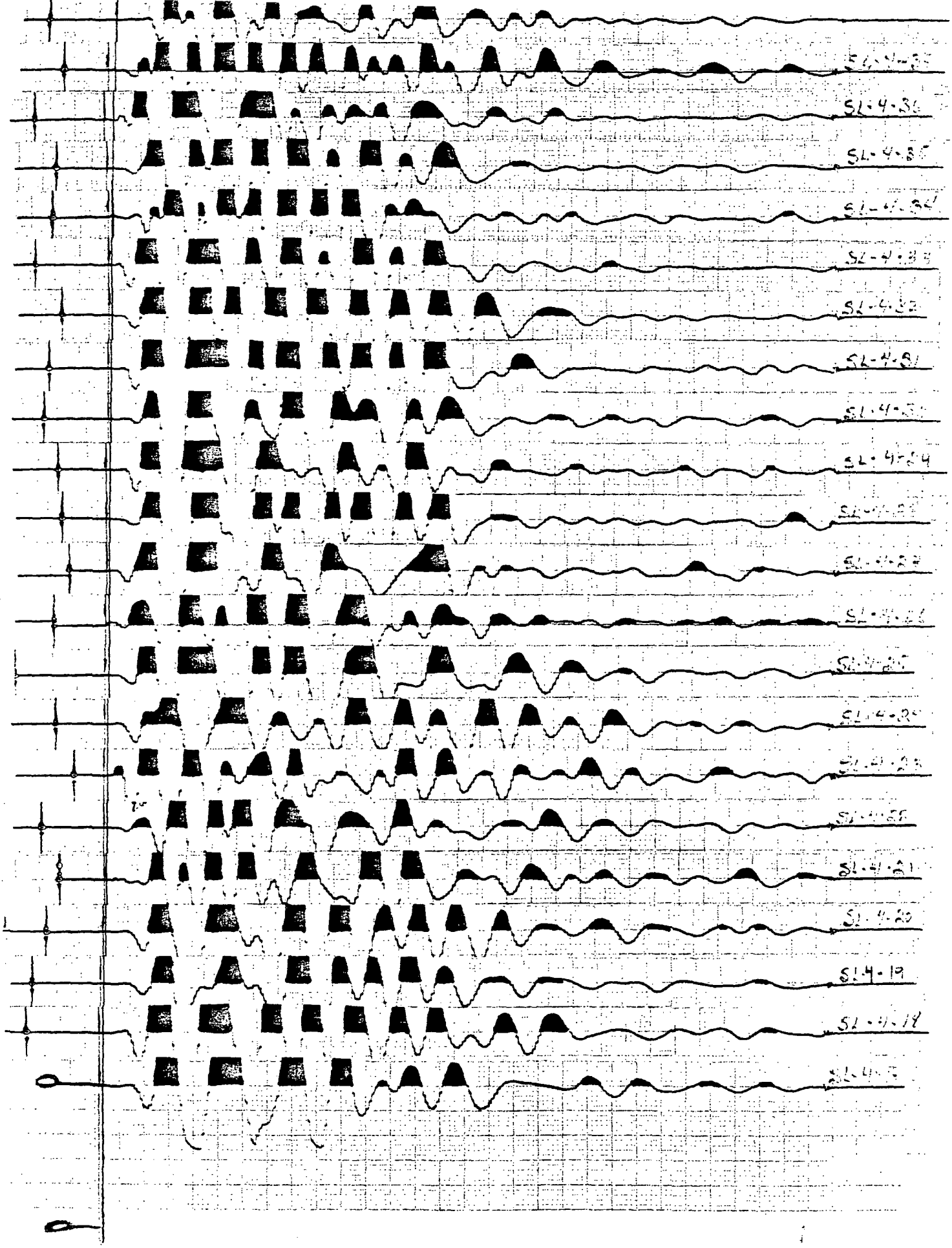
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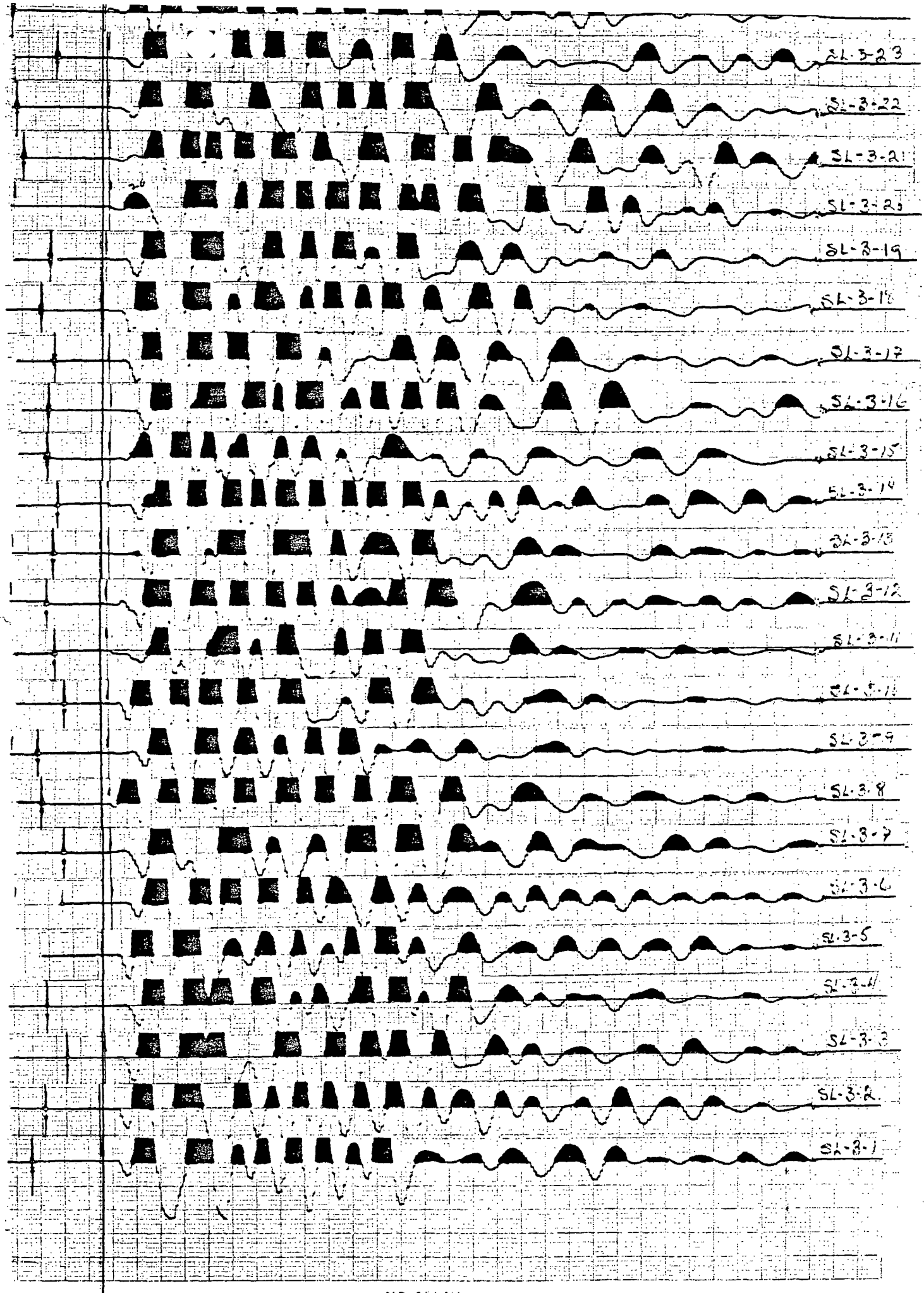

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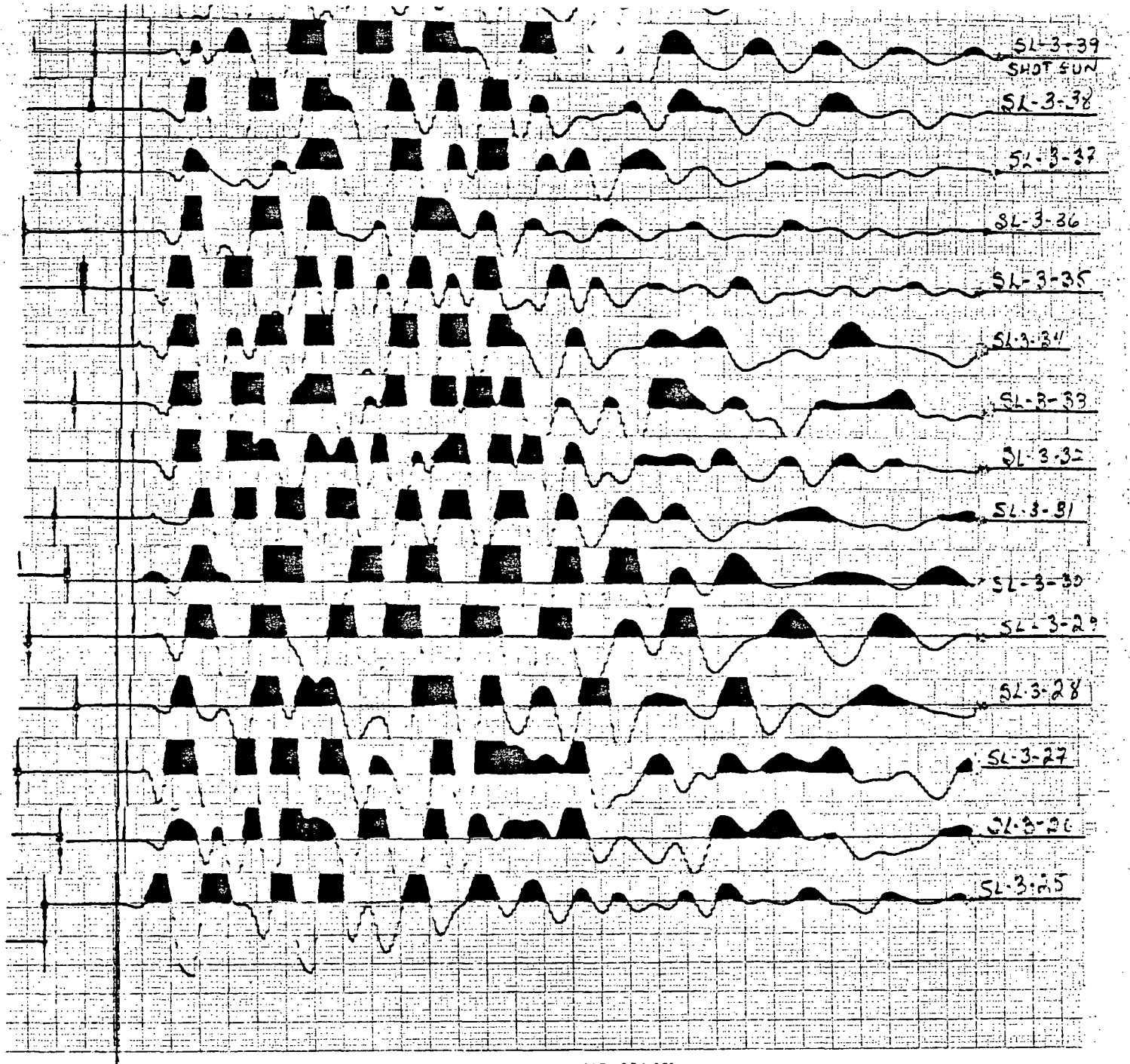

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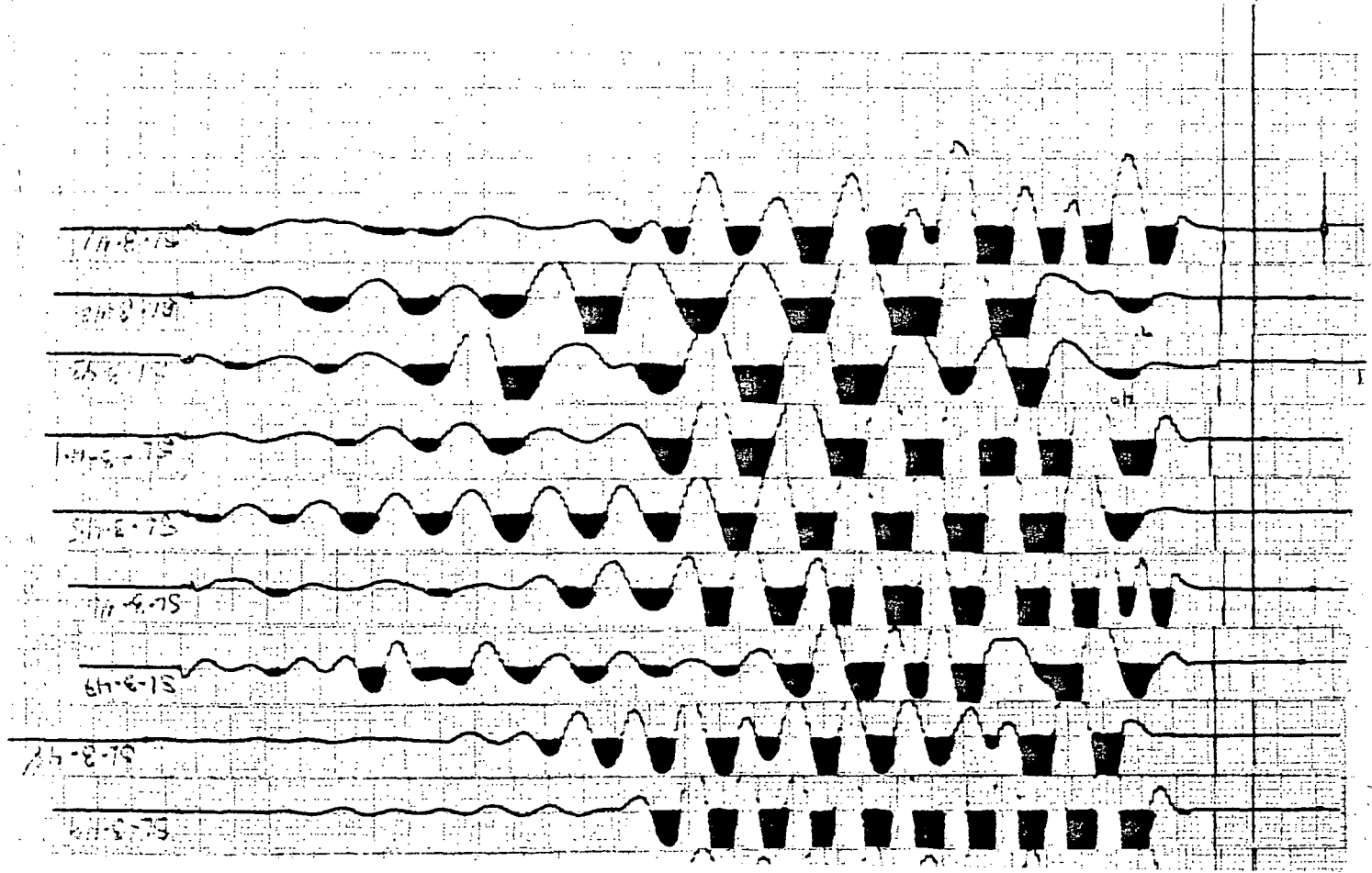

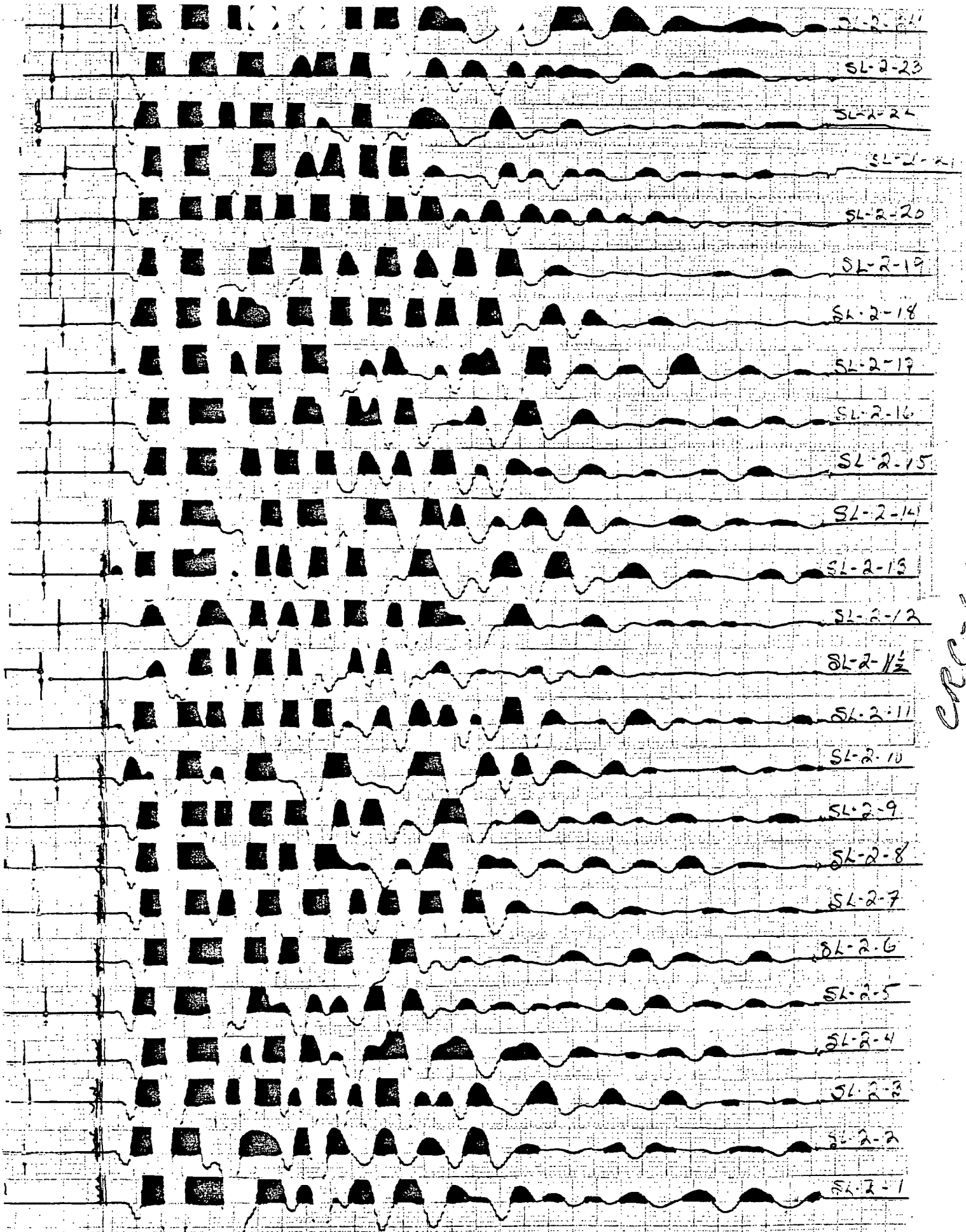
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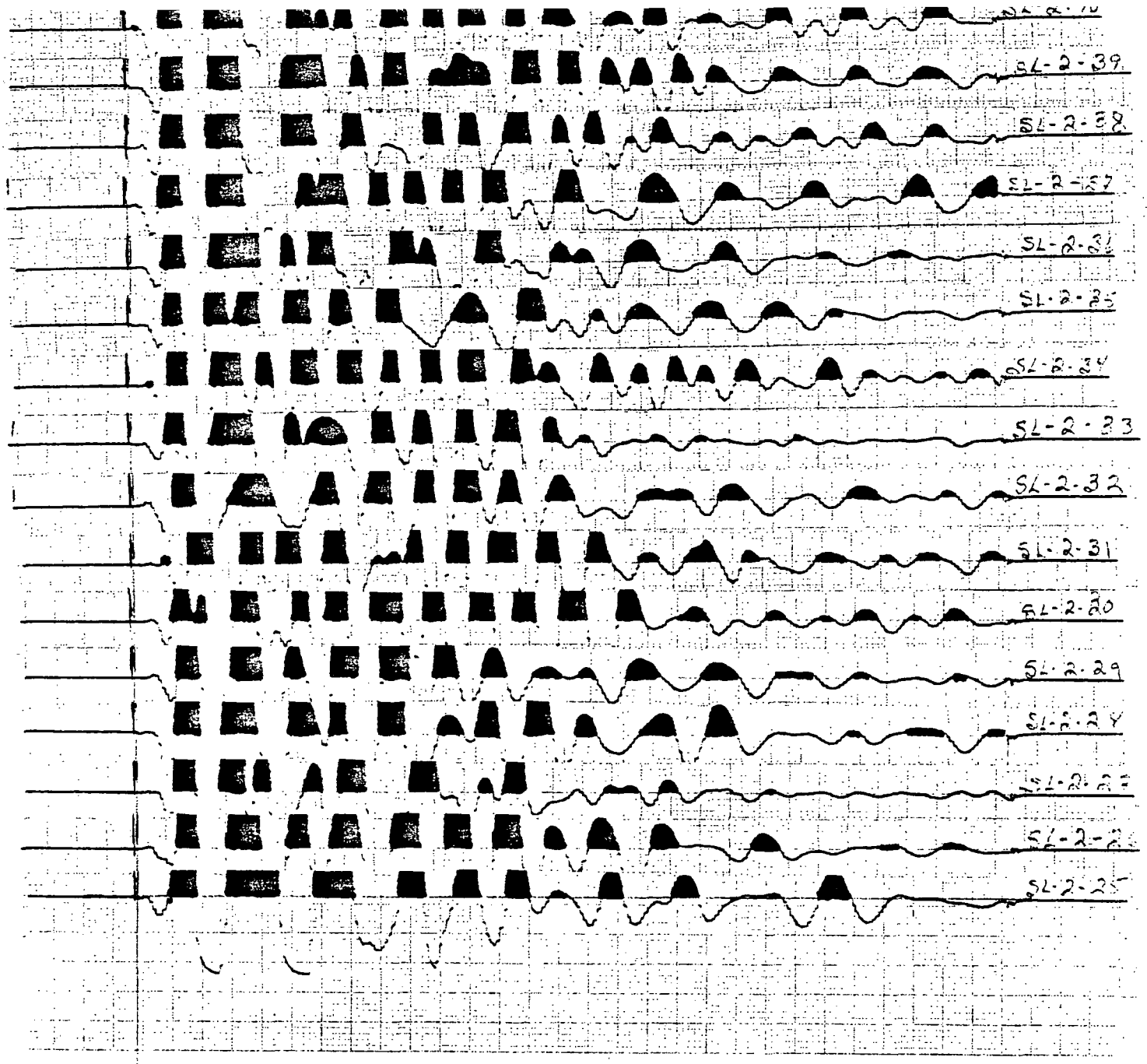
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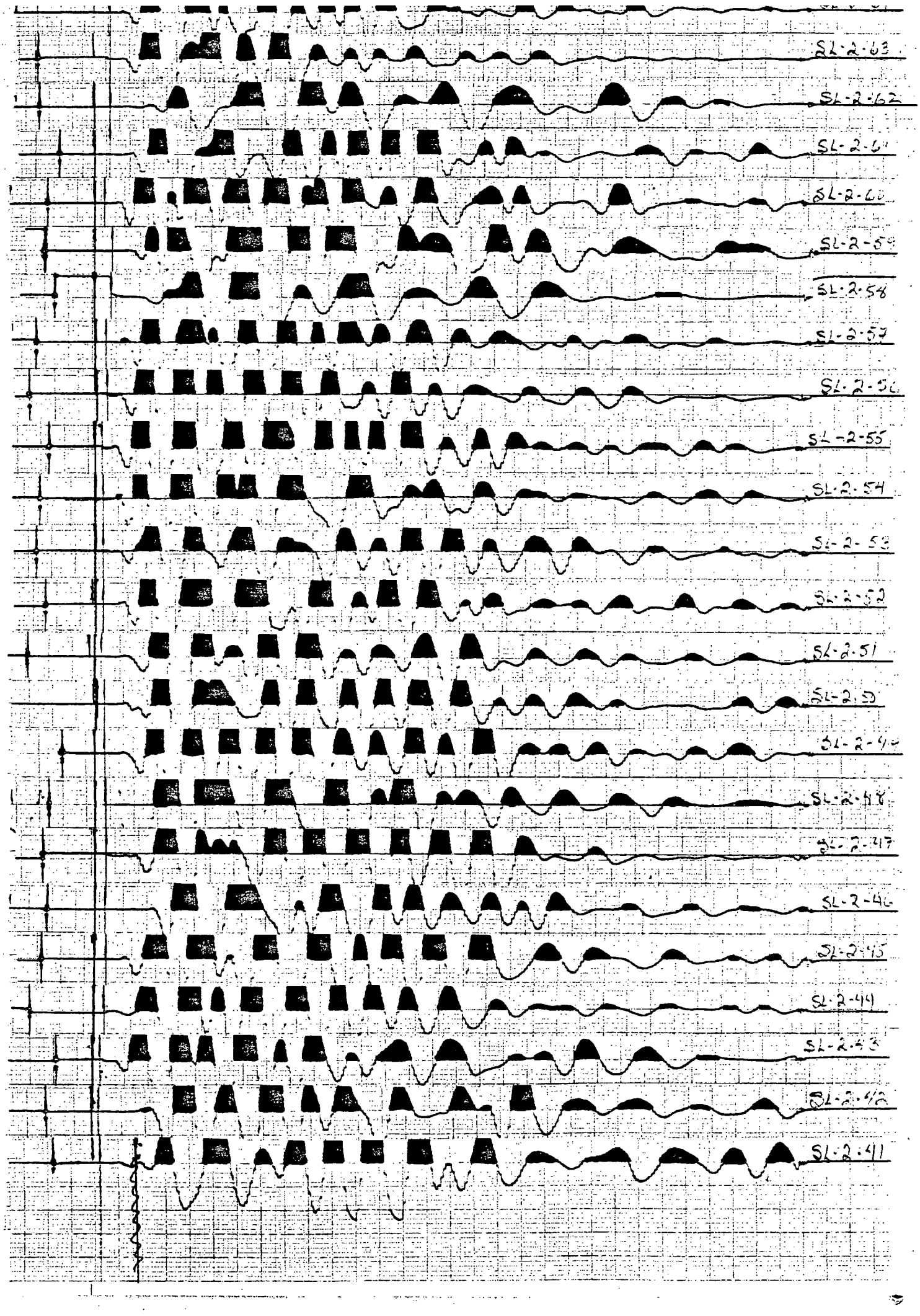
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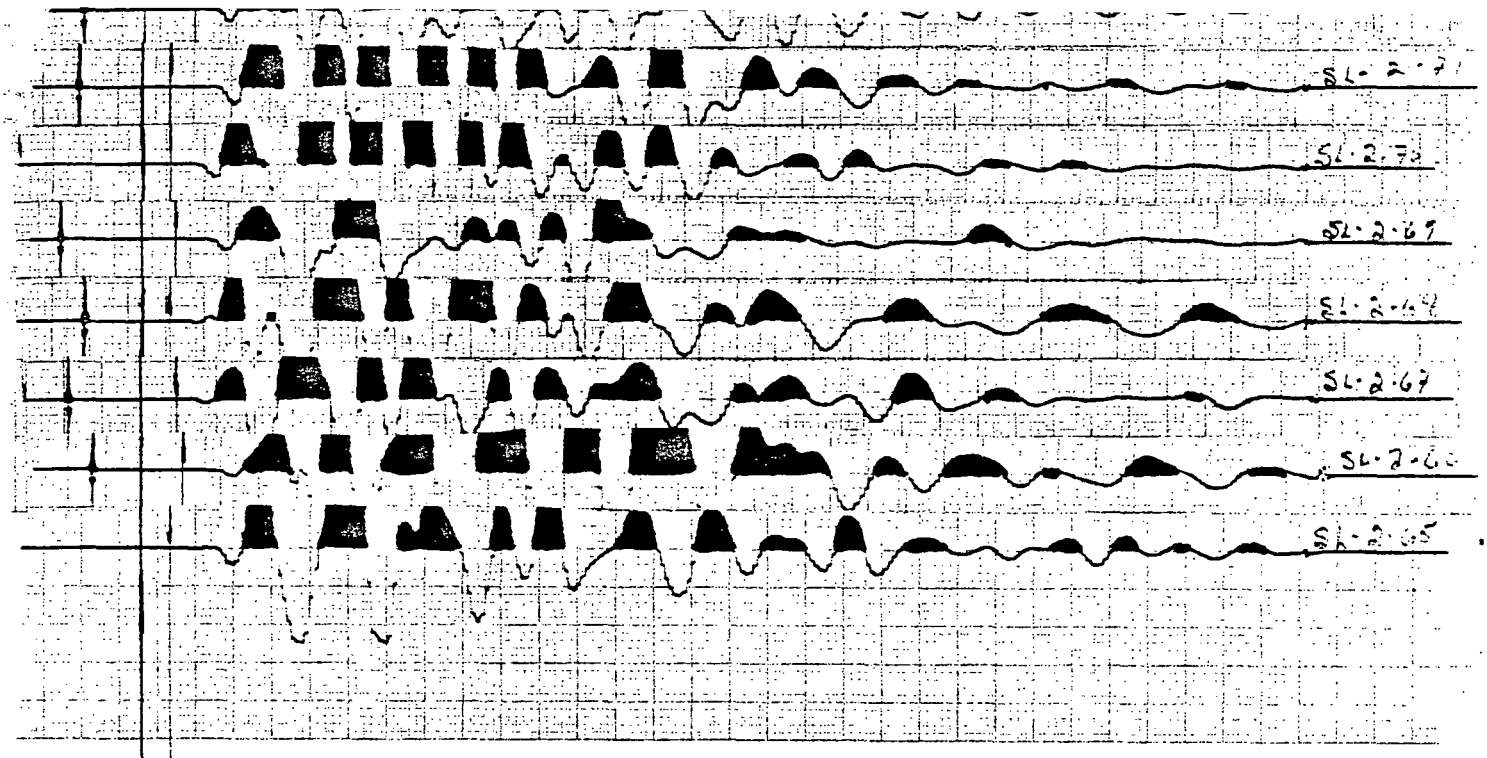
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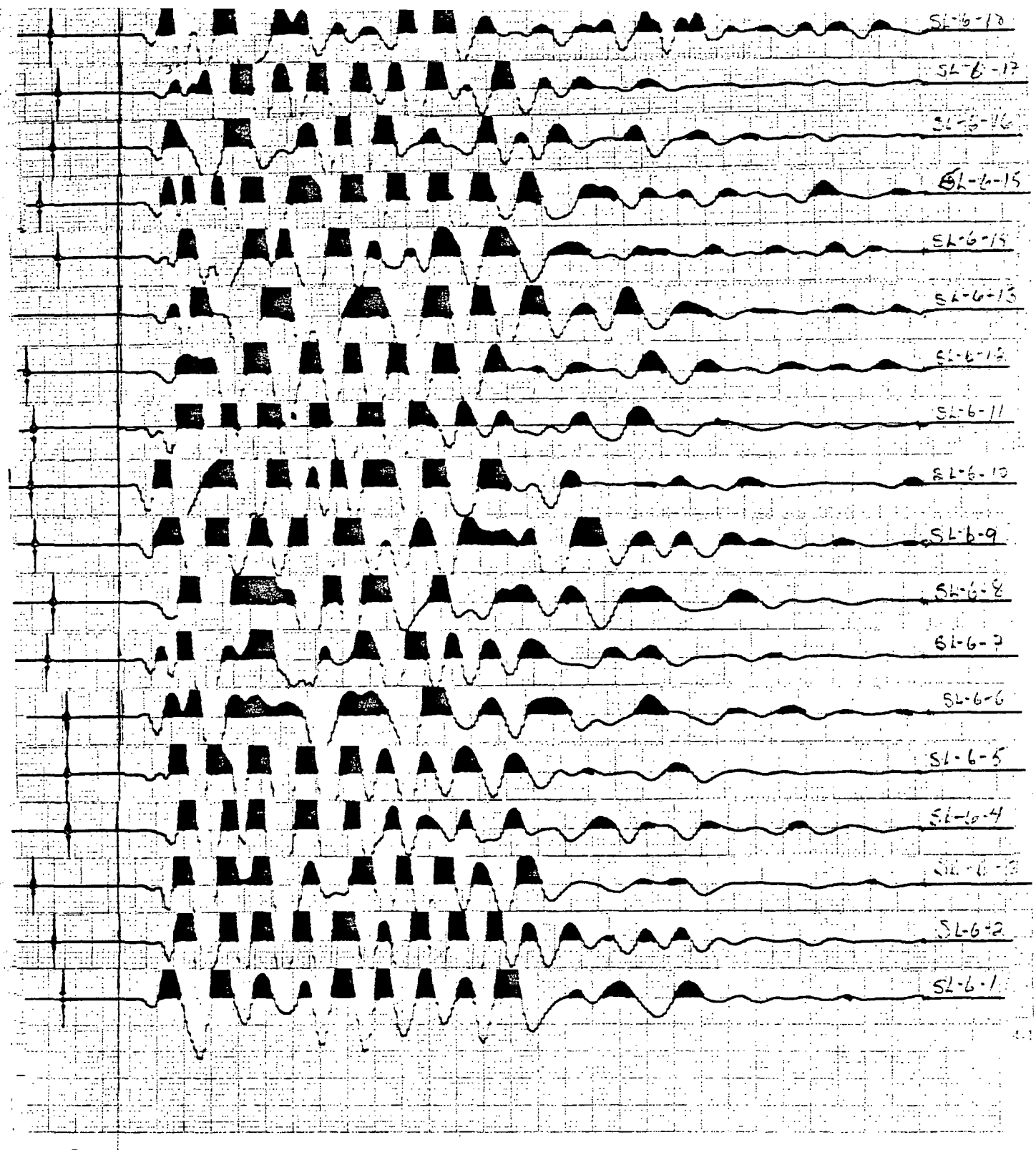
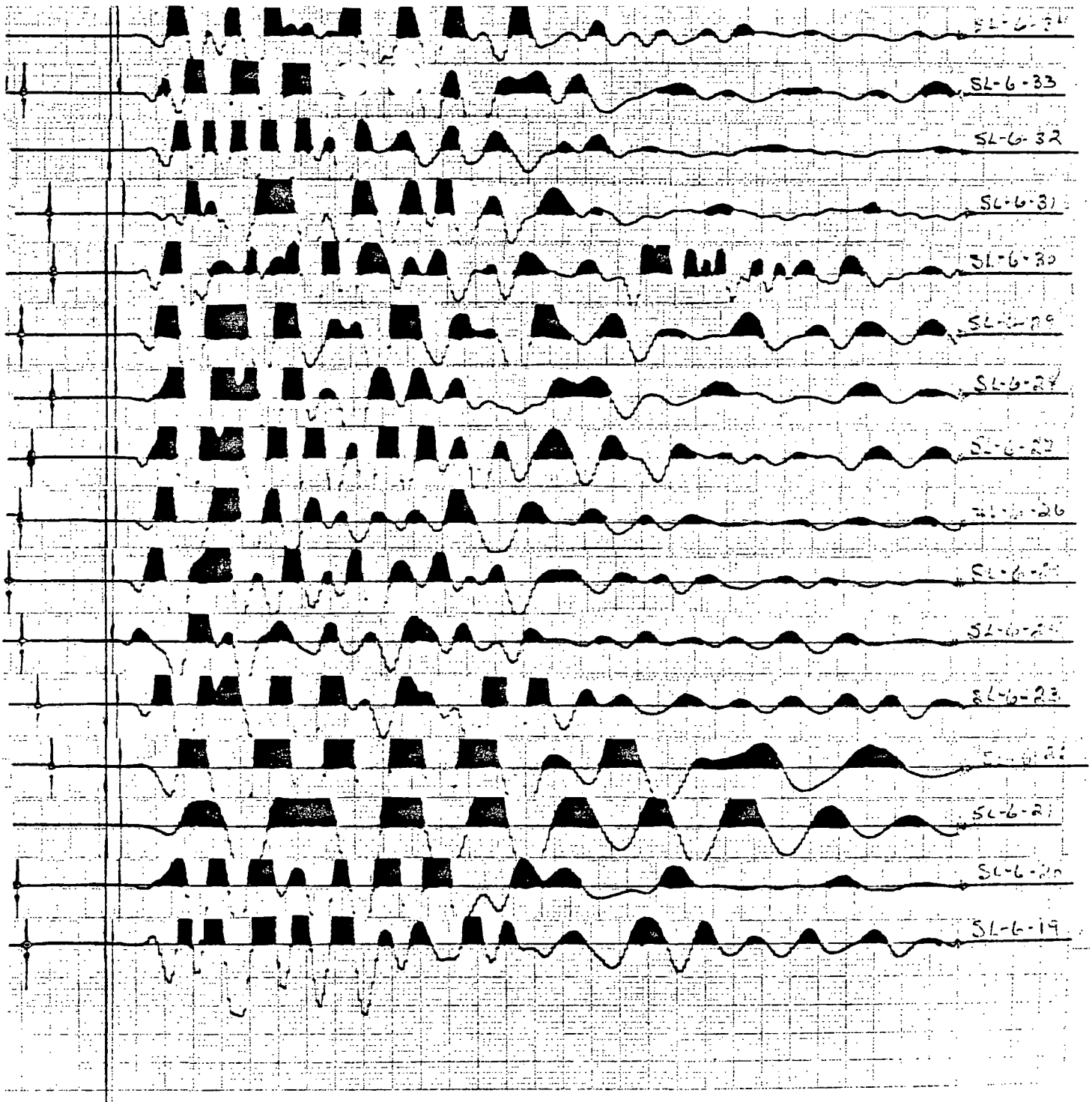


CRC-4

Soda Lake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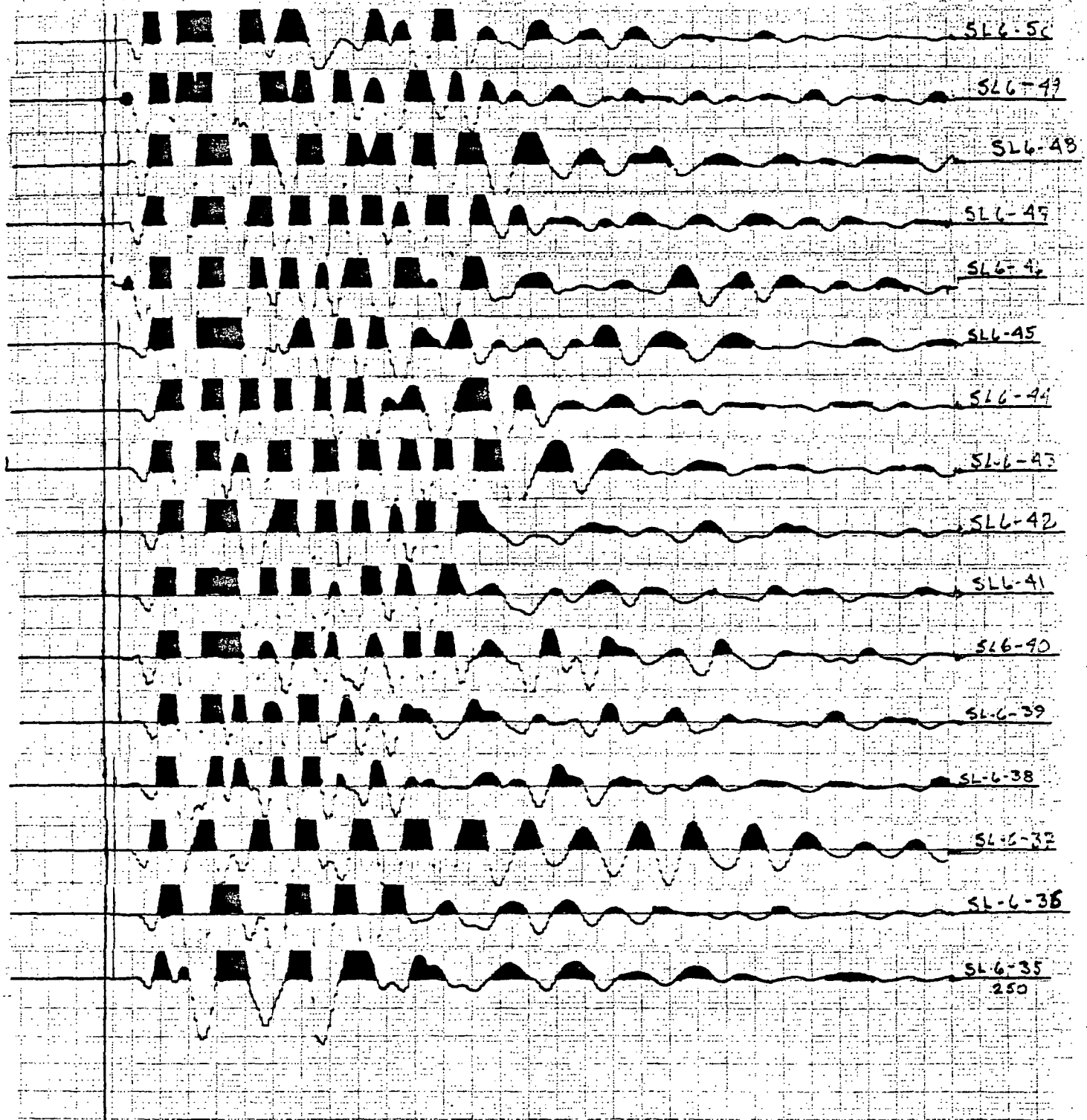
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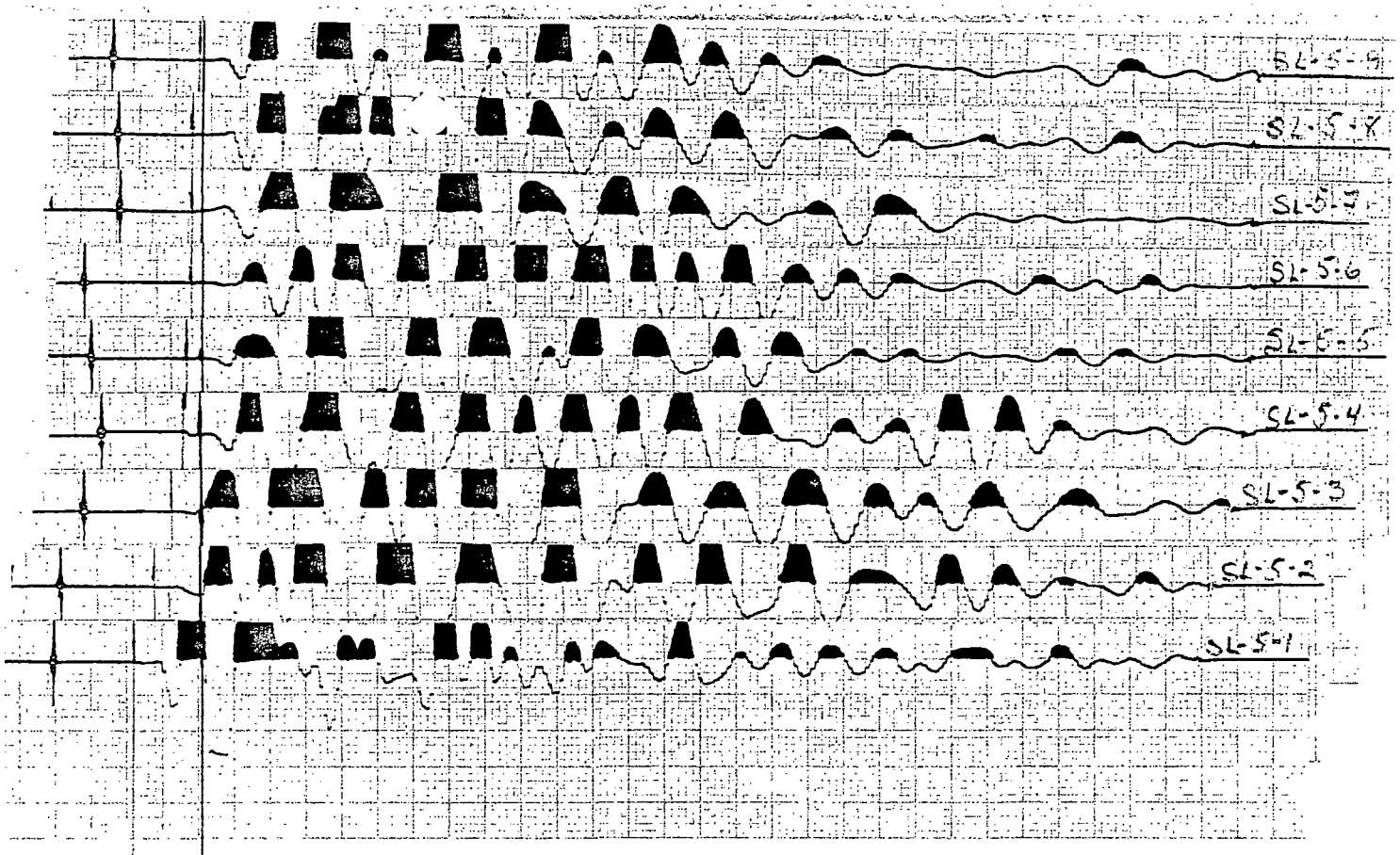

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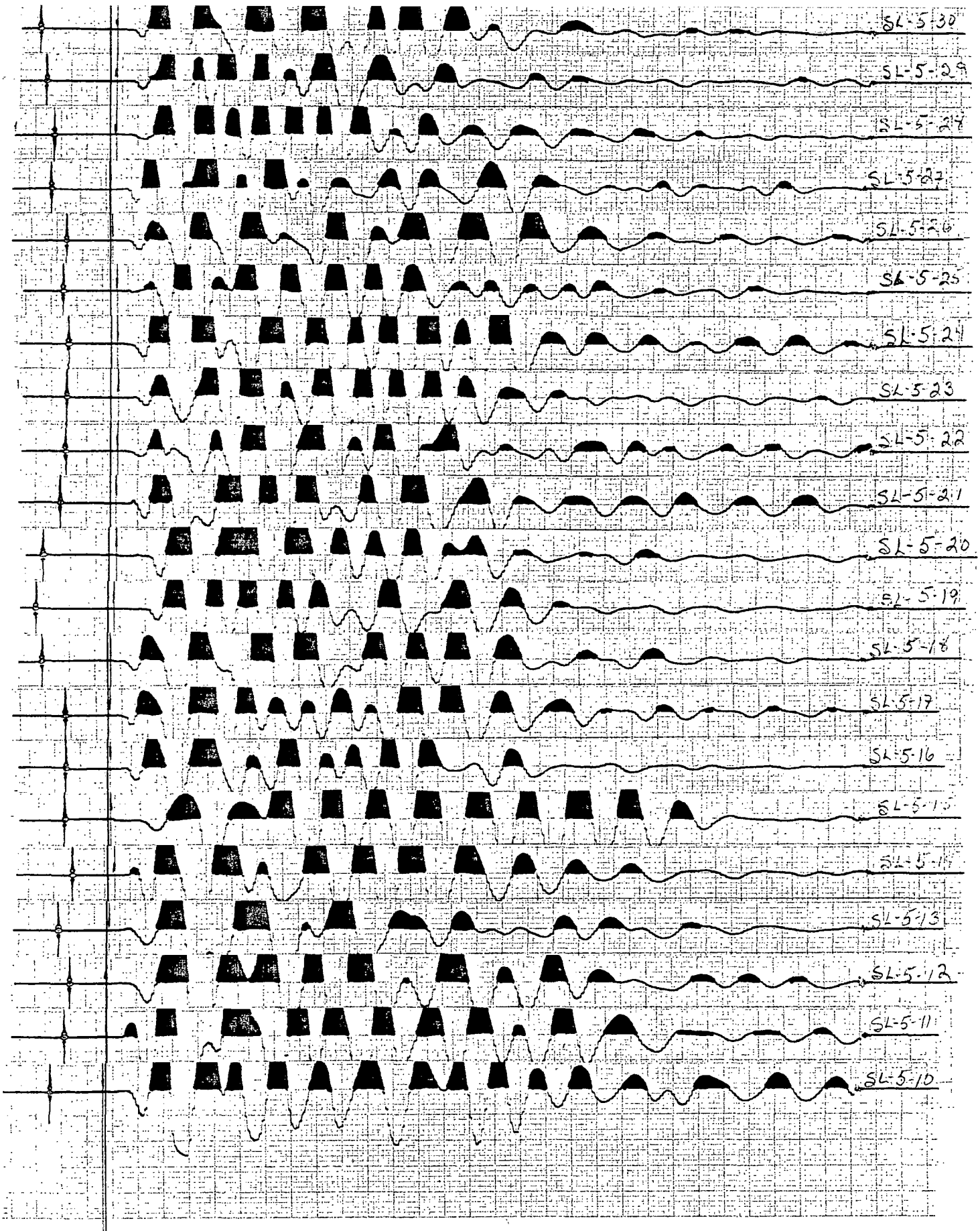
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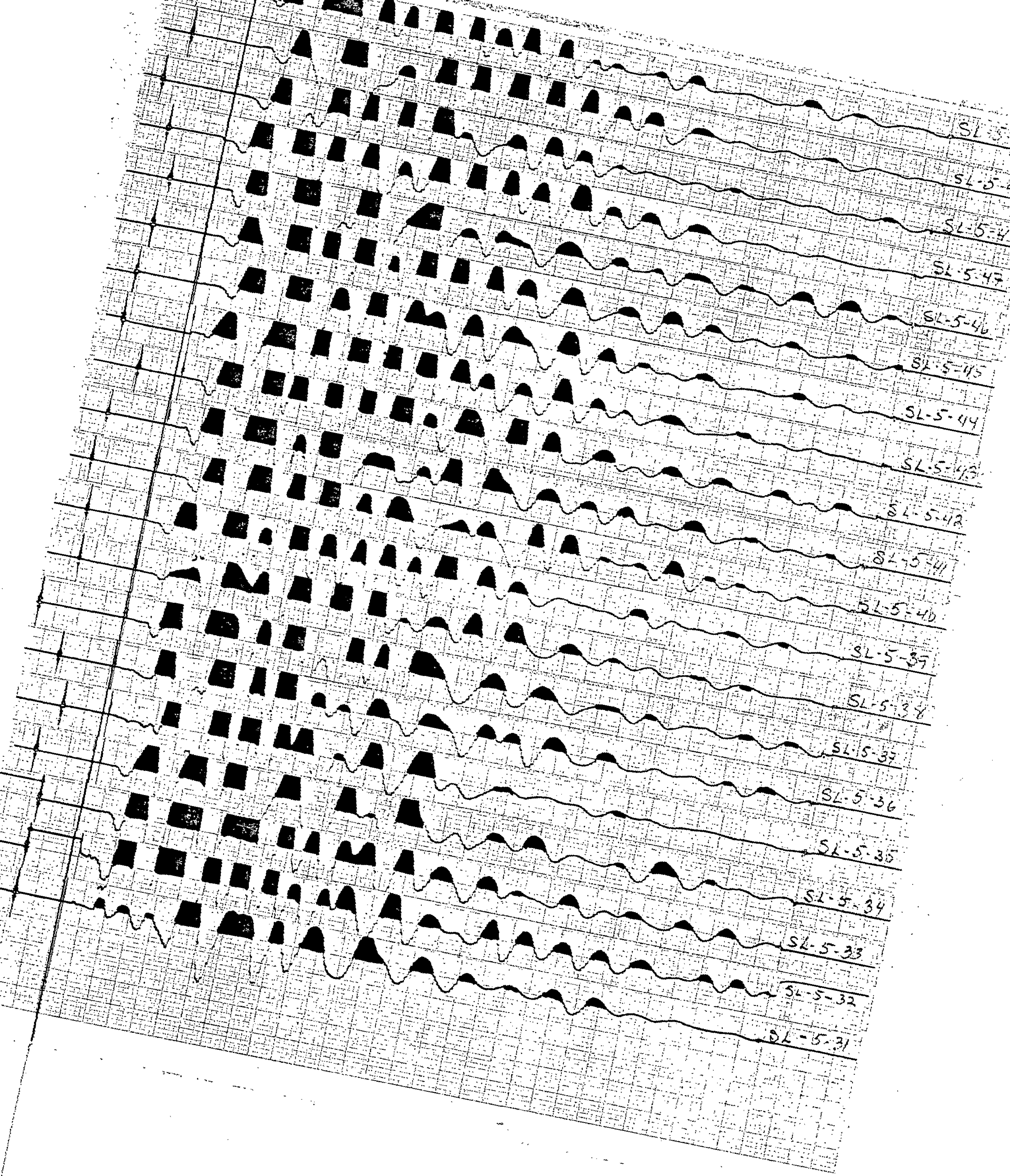
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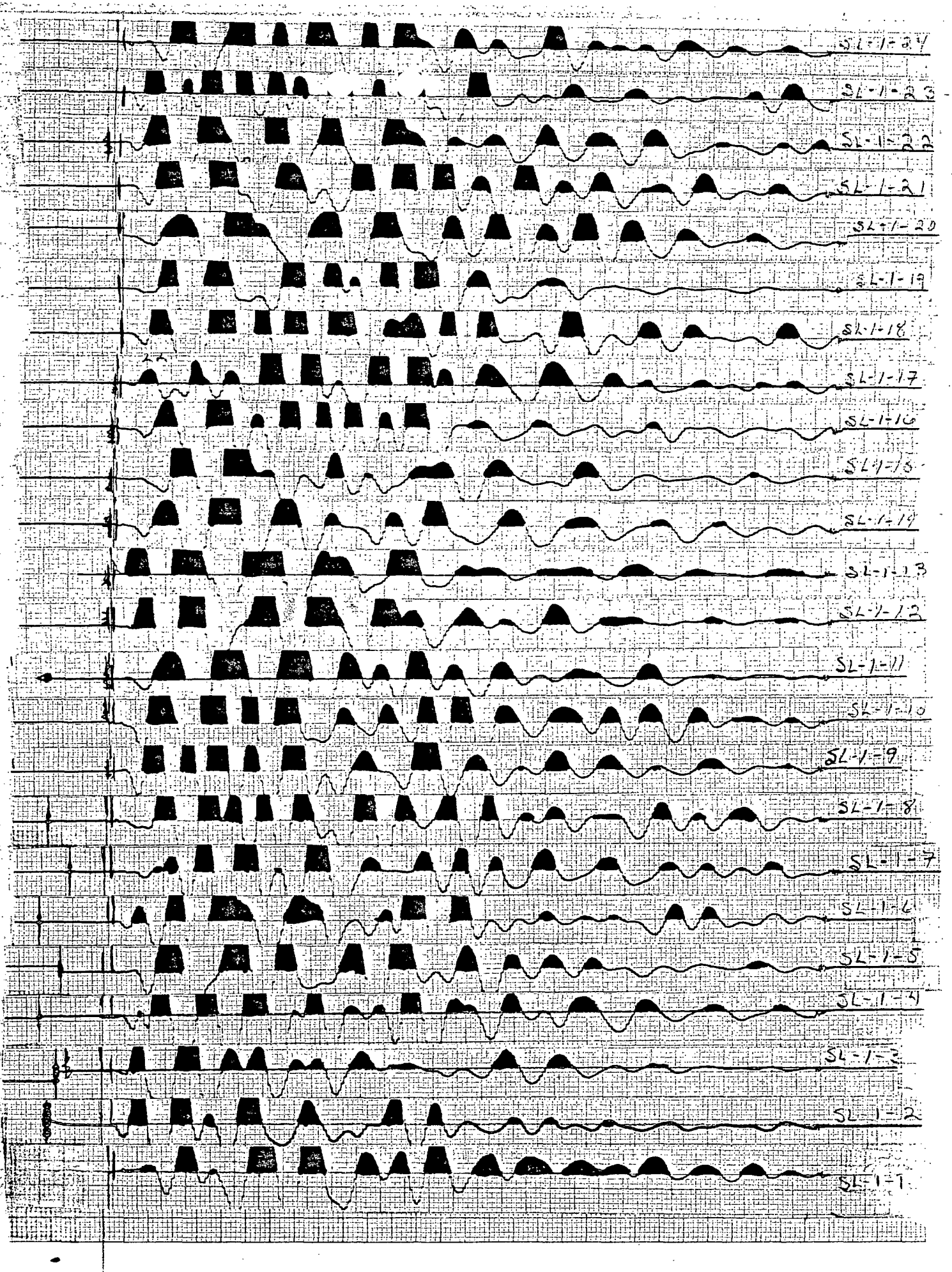
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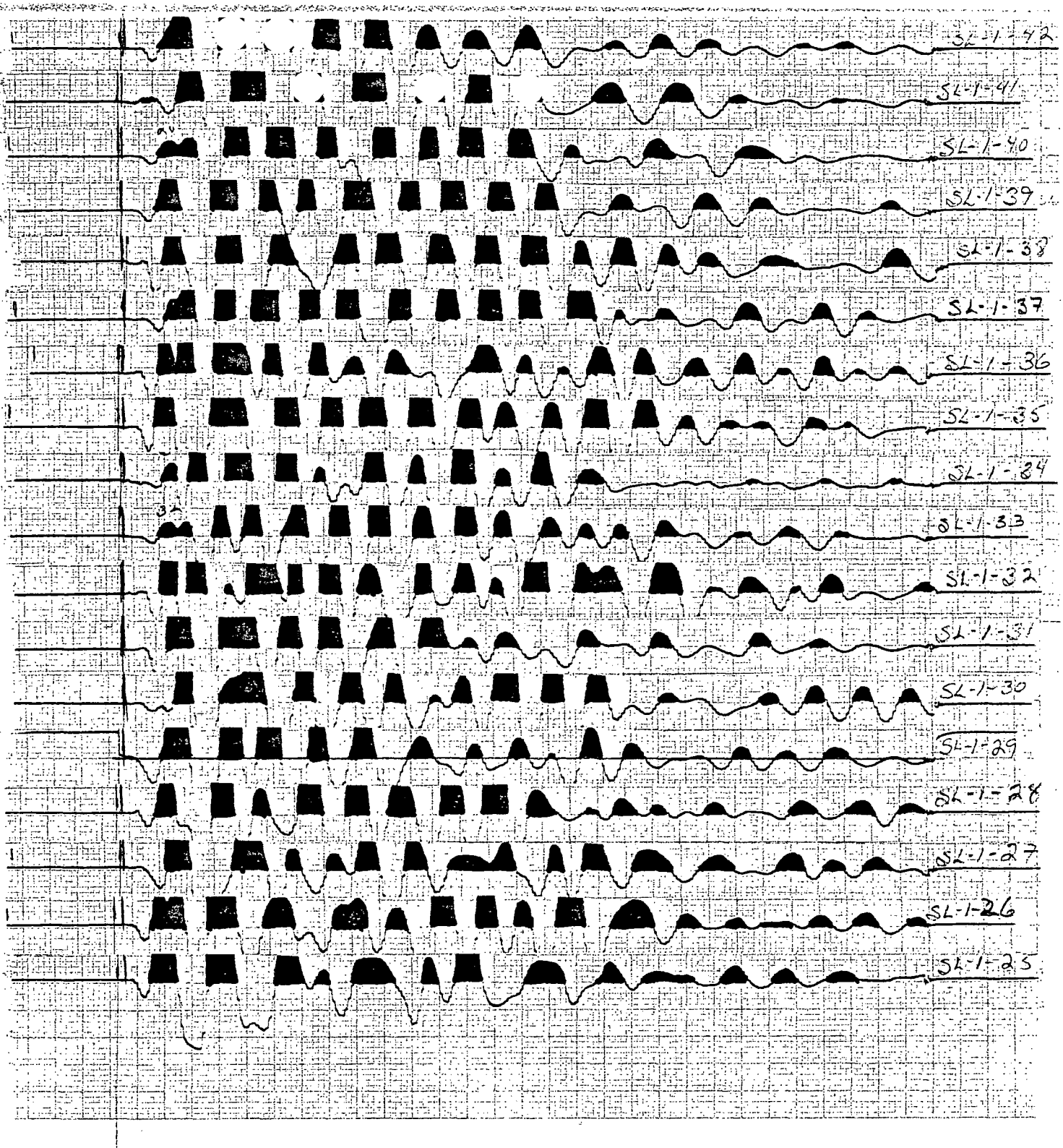
CRC-1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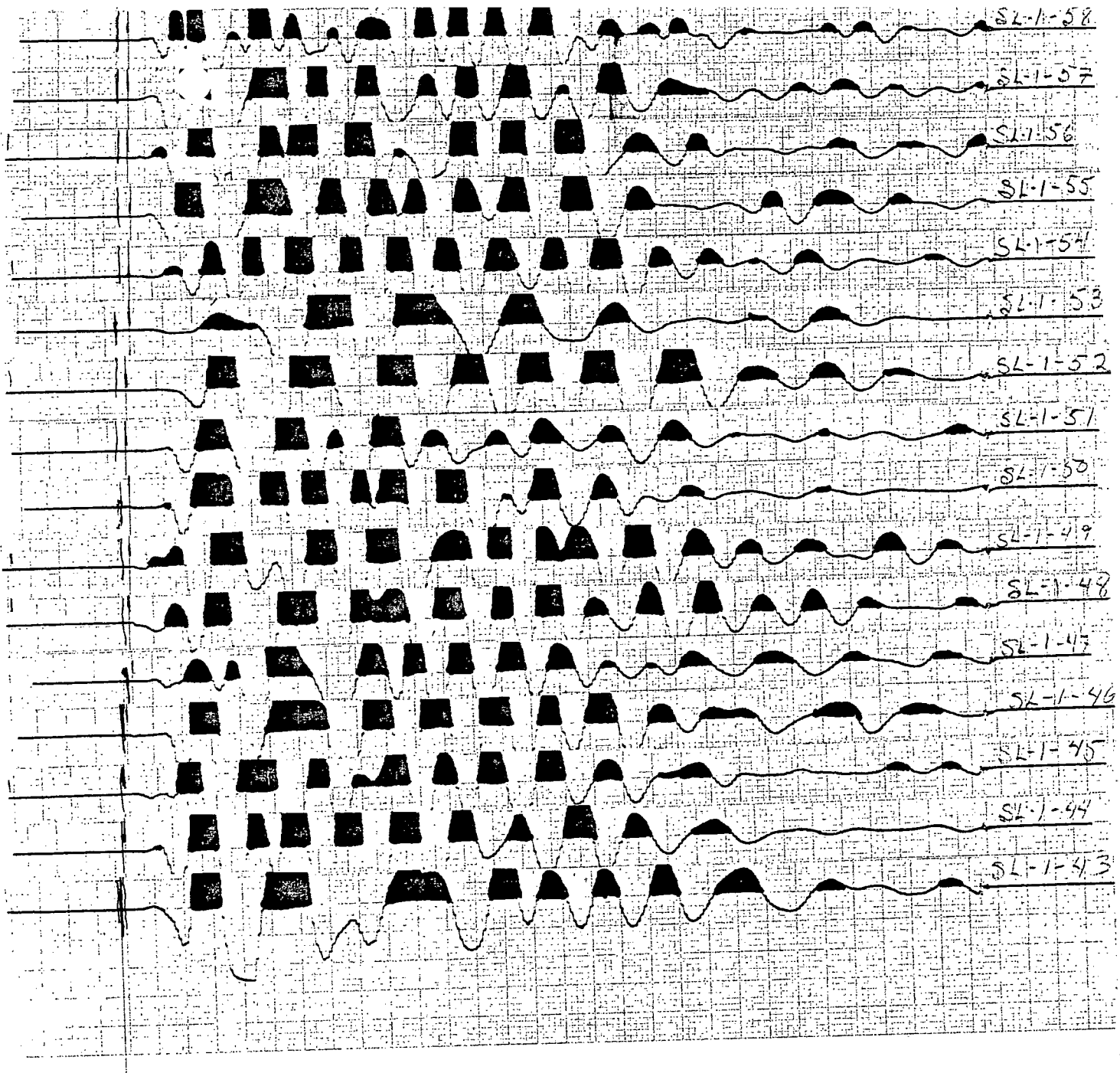
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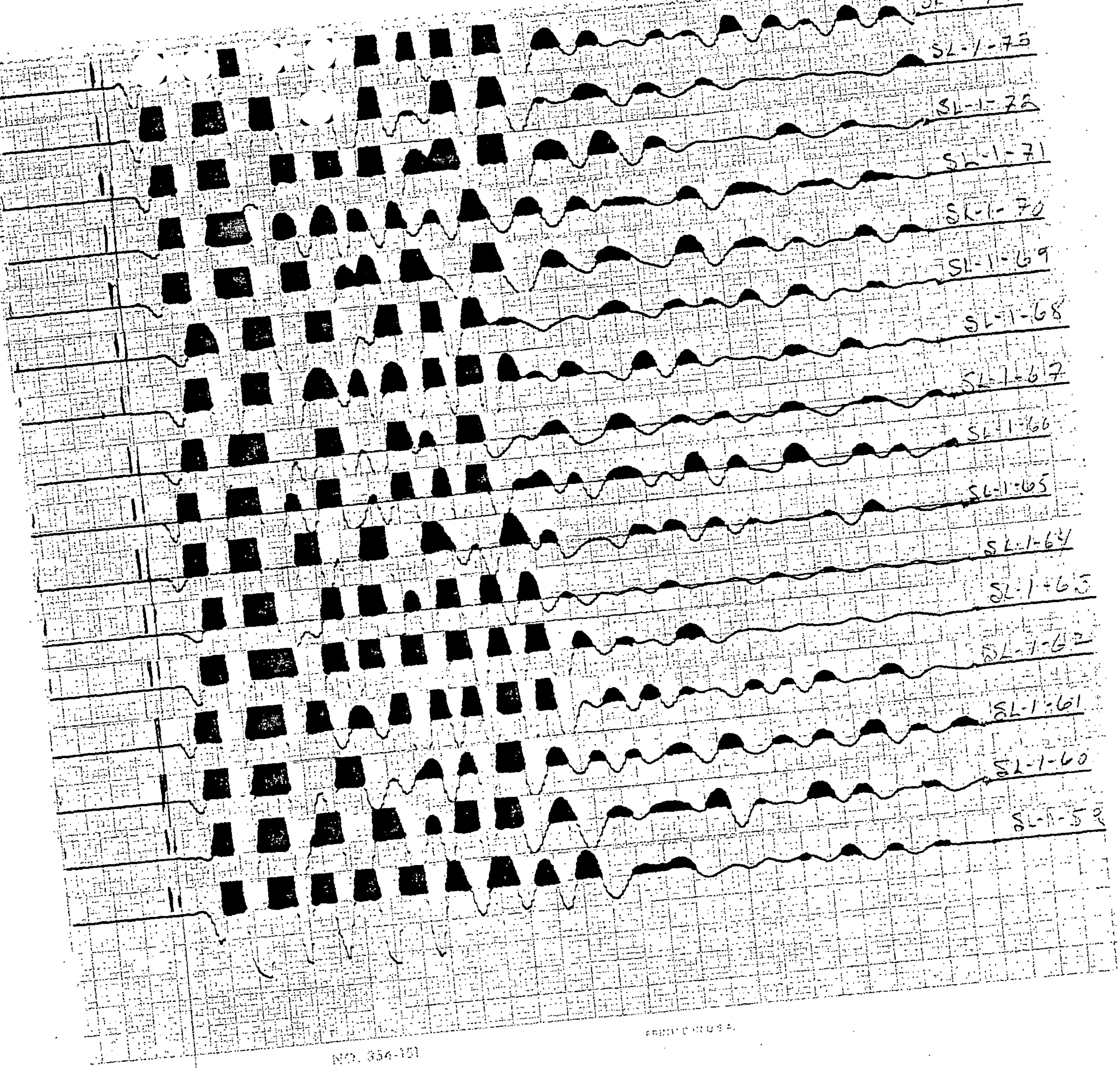
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Telephone (505) 294-6971

Charles B. Reynolds & Associates

Consulting Geophysicists and Geologists

11909 Allison Court N.E.
Albuquerque, New Mexico 87112

June 17, 1975

Chevron Oil Company
Minerals Staff
225 Bush Street
San Francisco, California 94104

Attention: Mr. W. E. Mero

Final Report Submittal
Soda Lake Area, Nevada

Dear Mr. Mero:

Enclosed are two copies of our final report covering the recent Soda Lake, Churchill County, Nevada shallow seismic reflection survey.

Perhaps the most interesting and potentially useful developments are the northwest-trending fault system and the suggestions of possible concentric faulting, folding and withdrawal subsidence around an indicated high (volcanic center ?) southwest of Soda Lake.

Thank you very much.

Yours truly,

Charles B. Reynolds

Charles B. Reynolds

CBR/ar

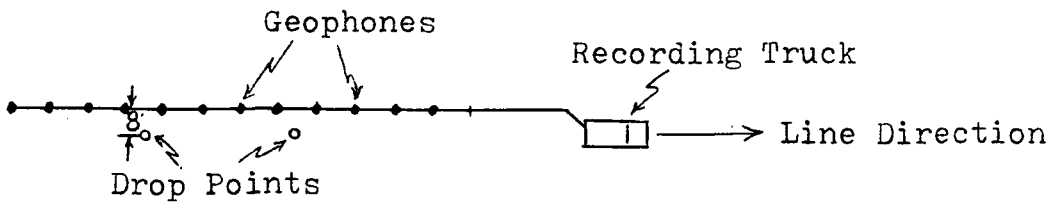
SODA LAKE AREA SEISMIC SURVEY

CHURCHILL COUNTY, NEVADA

Introduction: During April and early May, 1975, a shallow reflection seismic survey was carried out in the Soda Lake area, near Fallon, Nevada for the Minerals Staff of the Chevron Oil Company. The purpose of the survey was to provide structural geological information as an aid in exploration for geothermal steam resources. Faulting and folding systems were regarded as of importance in geothermal exploration in the area.

The survey consisted of seven lines (three east-west and four north-south) totalling about 24 miles in length. Station spacing along the lines was 330 feet (100 meters) measured by use of a measuring rope of that length. As many survey monuments such as section corners as possible were used in locating the lines accurately on a U.S.G.S. topographic map. Elevations for elevation corrections were taken from the topographic map, supplemented by field observations. The data were corrected to a reference datum plane at 4000 feet above sea level using a correction velocity of 5000 feet per second, which was selected on the basis of short refraction measurements.

The seismic energy source used consisted of a 300 lb. steel weight dropped free-fall 3.5 feet. The average number of drops summed at each station was slightly greater than three, for a total average energy of about 3300 ft/lbs per station. The recording instruments included a Seaman Nuclear Corp. single-channel engineering-type seismograph, with digital summing memory, modified to incorporate frequency filters, programmed gain expansion, a paper strip chart recorder and a magnetic cassette recorder. The reciever array consisted of 12 Mark Products 21L, 10Hz geophones spaced 12 feet apart inline for a theoretical group length of 144 feet. The weight was usually dropped one or more times at each of two positions 48 feet apart symetrically placed forward and back ofthe group center and offset about 8 feet from the geophone line (see sketch below) to achieve constant normal moveout. One-half second from time zero was recorded at each station.



The resulting data were assembled into elevation corrected VAR record sections with one centimeter trace spacing and a time scale of one second equals 30 cm.. The record sections were then picked, and migrated depth sections constructed using the point-arc method. In the point-arc method, a circular arc corresponding to the depth calculated for the picked, corrected time of an event at a given station is swung from the plot point (center of spread) for the station on the depth section. A curve tangent to that arc and adjacent station arcs for the same event is then drawn. The velocity function used for the Soda Lake survey is one fitted to the sonic log data from the Chevron-Phillips Soda Lake No. 1-29 well ($V_i=5000 + 4.16Z$, $Z<1200'$; $V_i=10,000$, $Z\geq 1200'$; velocities in ft/sec and Z in feet below +4000'). The depth of penetration indicated varied from about 1,000 feet to about 2,000 feet, but was more often about 1,500 feet.

Finally, a structure contour map was constructed, using the migrated depth section and based on a phantom near a reflection horizon believed to be reasonably persistent throughout the area. Correlation of this event between fault blocks is felt to be moderately reliable in most cases. The event chosen is commonly the deepest strong (high-amplitude) event recorded. As mapped, it varies from about 300 feet below datum at the highest point to nearly 1500 feet below datum at the lowest point. This horizon should have been penetrated at about 450-500 feet in the Chevron-Phillips No. 1-29 well. It appears at least locally possibly to be an angular unconformity. Table 1 shows the horizon depths used in making the map.

Results: The resulting record sections and migrated sections for Line SL-1 through SL-7 are included with this report as is the structure contour map.

The structure contour map shows the area to be characterized by northwest-trending faults and nearly equidimensional fault-related structural highs and lows. The faults appear to be generally short (the longest appears to be only about 1½ miles in map length) and the structural highs and lows generally are less than one-half square mile in area. One possible exception is a structural high indicated southwest of Soda Lake which may be much larger. Also of interest are two deep structural lows, one northwest and one east of Soda Lake. These have something of the appearance of withdrawal subsidence lows, and might be postulated to be part of a system of such lows ringing the larger structural high southwest of Soda Lake; if such is the case, the high might be a major volcanic dome or buried vent. It might further be postulated that the faults in this area trend northwest because they are part of a set of concentric faults ringing the volcanic center (?) southwest of Soda Lake.

Many other indicated faults of smaller displacement have been disregarded in the making of the map. Most of the

faults observed on the seismic data appear to be normal faults or vertical in attitude, but a few suggest high-angle reverse faults. None of the possible high-angle reverse faults, however, appear to have large displacement.

Another point of note with regard to the faults in the area is that few seem to generate well-developed diffraction systems. This may be interpreted to suggest that considerable crushing of nearby rock may be associated with the faulting here.

Respectfully submitted,

Charles B. Reynolds

Charles B. Reynolds
Registered Geophysicist (Calif.)
Certified Professional Geologist

Enclosures:

7 VAR record sections
7 migrated depth sections
1 structure contour map
1 table

TABLE I

Depths - Mapped Horizon

Soda Lake Area

Line SL-1

Sta. No.	Depth	Elevation	Sta. No.	Depth	Elevation
1	790	3210	48	740	3260
2	790	3210	49	735	3265
3	770	3230	50	745	3255
4	745	3255	51	750	3250
5	700	3300	52	725	3275
6	850	3150	53	650	3350
7	850	3150	54	650	3350
8	830	3170	55	685	3315
9	800	3200	56	685	3315
10	750	3250	57	660	3340
11	730	3270	58	630	3370
12	750	3250	59	680	3320
13	NV		60	710	3290
14	NV		61	715	3285
15	NV		62	715	3285
16	NV		63	715	3285
17	NV		64	700	3300
18	1365	2635	65	NV	
19	1350	2650	66	600	3400
20	1300	2700	67	600	3400
21	1220	2780	68	610	3390
22	1165	2835	69	620	3380
23	1115	2885	70	665	3335
24	1055	2945	71	670	3330
25	1000	3000	72	700	3300
26	925	3055	73	730	3270
27	900	3100	74	725	3275
28	870	3130			
29	810	3190			
30	750	3250			
31	705	3295			
32	670	3330			
33	650	3350			
34	645	3355			
35	650	3350			
36	675	3325			
37	700	3300			
38	700	3300			
39	725	3275			
40	760	3240			
41	785	3215			
42	800	3200			
43	820	3180			
44	845	3155			
45	850	3150			
46	825	3175			
47	775	3225			

TABLE I

Depths - Mapped Horizon
Soda Lake Area

Line SL-2

Sta. No.	Depth	Elevation	Sta. No.	Depth	Elevation
1	635	3365	48	565	3435
2	630	3370	49	590	3410
3	635	3365	50	620	3380
4	650	3350	51	640	3360
5	NV		52	630	3370
6	750	3250	53	660	3340
7	770	3230	54	650	3350
8	800	3200	55	600	3400
9	810	3190	56	550	3450
10	NV		57	520	3480
11	530	3470	58	480	3520
11.5	550	3450	59	365	3635
12	565	3435	60	425	3575
13	590	3410	61	445	3555
14	585	3415	62	430	3570
15	615	3385	63	500	3500
16	630	3370	64	520	3480
17	675	3325	65	510	3490
18	700	3300	66	575	3425
19	750	3250	67	570	3430
20	780	3220	68	545	3455
21	800	3200	69	530	3470
22	800	3200	70	525	3475
23	790	3210	71	525	3475
24	770	3230	72	500	3500
25	760	3240			
26	735	3265			
27	NV				
28	385	3615			
29	380	3620			
30	375	3625			
31	425	3575			
32	440	3560			
33	440	3560			
34	450	3550			
35	485	3515			
36	510	3490			
37	535	3465			
38	560	3440			
39	585	3415			
40	600	3400			
41	360	3640			
42	375	3625			
43	430	3570			
44	475	3525			
45	525	3475			
46	580	3420			
47	650	3350			

TABLE I

Depths - Mapped Horizon

Soda Lake Area

Line SL-3			Line SL-4		
Sta. No.	Depth	Elevation	Sta. No.	Depth	Elevation
1	550	3450	1	825	3175
2	580	3420	2	775	3225
3	600	3400	3	740	3260
4	630	3370	4	705	3295
5	640	3360	5	685	3315
6	630	3370	6	360	3640
7	630	3370	7	375	3625
8	630	3370	8	410	3590
9	660	3320	9	450	3550
10	655	3345	10	460	3540
11	630	3370	11	510	3490
12	685	3315	12	550	3450
13	645	3355	13	585	3415
14	625	3375	14	605	3395
15	575	3425	15	645	3355
16	550	3450	16	690	3310
17	535	3465	17	725	3275
18	525	3475	18	770	3230
19	475	3525	19	820	3180
20	440	3560	20	845	3155
21	400	3600	21	835	3165
22	385	3615	22	785	3215
23	390	3610	23	780	3220
24	420	3580	24	780	3220
25	475	3525	25	790	3210
26	490	3510	26	780	3220
27	500	3500	27	760	3240
28	480	3520	28	765	3235
29	550	3450	29	775	3225
30	610	3390	30	800	3200
31	635	3365	31	775	3225
32	735	3265	32	740	3260
33	680	3320	33	720	3280
34	640	3360	34	535	3465
35	610	3390	35	565	3435
36	625	3375	36	600	3400
37	625	3375	37	620	3380
38	620	3380	38	625	3375
39	600	3400			
40	550	3450			
41	485	3515			
42	430	3570			
43	475	3525			
44	530	3470			
45	585	3415			
46	635	3365			
47	NV				
48	670	3330			
49	675	3325			
50	660	3340			

TABLE I

Depths - Mapped Horizon

Soda Lake Area

Line SL-5			Line SL-6		
Sta. No.	Depth	Elevation	Sta. No.	Depth	Elevation
1	665	3335	1	NV	
2	690	3310	2	1435	2565
3	720	3280	3	1410	2590
4	795	3205	4	1385	2615
5	845	3155	5	1330	2670
6	875	3125	6	1235	2765
7	920	3080	7	1120	2880
8	955	3045	8	1025	2975
9	940	3060	9	930	3070
10	895	3105	10	775	3225
11	990	3010	11	730	3270
12	935	3065	12	665	3335
13	875	3125	13	625	3575
14	850	3150	14	650	3350
15	835	3165	15	630	3370
16	820	3180	16	610	3390
17	785	3215	17	600	3400
18	780	3220	18	620	3380
19	800	3200	19	650	3350
20	820	3180	20	475	3525
21	840	3160	21	480	3520
22	695	3305	22	495	3505
23	640	3360	23	515	3485
24	600	3400	24	545	3455
25	570	3430	25	595	3405
26	565	3435	26	630	3370
27	580	3420	27	640	3360
28	620	3380	28	620	3380
29	670	3330	29	615	3385
30	680	3320	30	520	3480
31	NV		31	510	3490
32	660	3340	32	500	3500
33	670	3330	33	485	3515
34	660	3340	34	480	3520
35	640	3360	35	500	3500
36	840	3160	36	570	3430
37	800	3200	37	615	3385
38	810	3190	38	620	3380
39	810	3190	39	615	3385
40	815	3185	40	585	3415
41	830	3170	41	585	3415
42	830	3170	42	625	3375
43	820	3180	43	655	3345
44	815	3185	44	630	3370
45	810	3190	45	605	3395
46	760	3240	46	630	3370
47	780	3220	47	665	3335
48	765	3235	48	620	3380
49	750	3250	49	605	3395
50	735	3265	50	585	3415

TABLE I

Depths - Mapped Horizon

Soda Lake Area

Line SL-7

Sta. No.	Depth	Elevation	Sta. No.	Depth	Elevation
1	NV		48	410	3590
2	750	3250	49	415	3585
3	680	3320	50	420	3580
4	645	3355	51	445	3555
5	625	3375	52	360	3640
6	580	3420	53	315	3685
7	550	3450	54	300	3700
8	550	3450	55	270	3730
9	540	3460	56	255	3745
10	540	3460	57	265	3735
11	555	3445			
12	600	3400			
13	610	3390			
14	610	3390			
15	610	3390			
16	610	3390			
17	610	3390			
18	NV				
19	NV				
20	350	3650			
21	405	3595			
22	450	3550			
23	475	3525			
24	495	3505			
25	525	3475			
26	350	3650			
27	360	3640			
28	375	3625			
29	380	3620			
30	385	3615			
31	560	3440			
32	560	3440			
33	540	3460			
34	545	3455			
35	560	3440			
36	550	3450			
37	480	3520			
38	470	3530			
39	450	3550			
40	445	3555			
41	435	3565			
42	415	3585			
43	400	3600			
44	445	3555			
45	410	3590			
46	400	3600			
47	405	3595			